



Apple® Serial NB card Installation Guide

Serial Connection for a NuBus™

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Apple Confidential

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Radio and television interference

The equipment described in this manual generates and uses radio-frequency energy. If it is not installed and used properly—that is, in strict accordance with Apple's instructions—it may cause interference with radio and television reception.

This equipment has been tested and complies with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of Federal Communications Commission (FCC) rules. These specifications are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that the interference will not occur in a particular installation.

You can determine whether your computer is causing interference by turning it off. If the interference stops, it was probably caused by the computer or one of the peripheral devices.

If your computer system does cause interference to radio or television reception, try to correct the interference by using one or more of the following measures:

- Turn the television or radio antenna until the interference stops.
- Move the computer to one side or the other of the television or radio.
- Move the computer farther away from the television or radio.
- Plug the computer into an outlet that is on a different circuit from the television or radio. (That is, make certain the computer and the television or radio are on circuits controlled by different circuit breakers or fuses.)
- Consider installing a rooftop television antenna with a coaxial cable lead-in between the antenna and the television.

If necessary, consult your authorized Apple dealer or an experienced radio/television technician for additional suggestions. You may find helpful the following booklet, prepared by the FCC: "How to Identify and Resolve Radio-TV Interference Problems" (stock number 004-000-00345-4). This booklet is available from the U.S. Government Printing Office, Washington, DC 20402.

△ **Important** This product was tested for FCC compliance under conditions that included the use of shielded cables and connectors between system components. It is important that you use shielded cables and connectors to reduce the possibility of causing interference to radios, television sets, and other electronic devices. For Apple peripheral devices, you can obtain the proper shielded cables from your authorized Apple dealer. For non-Apple peripheral devices, contact the manufacturer or dealer for assistance. △

About This Guide

THIS INSTALLATION GUIDE INTRODUCES THE APPLE SERIAL NB CARD AND TELLS you how to install it into your Macintosh® II computer. The card provides additional communications processing capabilities to your computer. After you install the card and appropriate networking software, you can use the card to connect to various networking environments.

What you need to know

To use this manual, you should be familiar with the operation of your Macintosh computer and with general networking concepts. This manual also assumes that you have some familiarity with network administration tasks and responsibilities.

How to use this guide

You can use the guide according to your level of experience with networking. The first chapter introduces you to the Apple Serial NB card and provides a brief overview of its typical uses. The second chapter gives step-by-step instructions for installing the card into a Macintosh II computer. The third chapter describes cabling options available with the card and shows which ports to use for various networking environments.

Use the chart in Figure P-1 to determine which chapters you need to read.

- **Figure P-1** Road map to the *Apple Serial NB card Installation Guide*

L-1
38w x 32d
33.5 pi caption to art b/b

Conventions

Sections of the manual that provide step-by step instructions use boldface type. General instructions are numbered and written in boldface and explanations of the instructions are written below them in regular typeface. This allows you to quickly review the steps of a task by scanning through the instructions in boldface.

The following words mark special messages to you:

◆ *Note:* Text set off in this manner presents sidelights or interesting points of information.

△ **Important** Text set off in this manner—with the word **Important**—presents important information or instructions. △

▲ **Warning** Text set off in this manner—with the word **Warning**—indicates potentially serious problems. ▲

Introduction to the Apple Serial NB card

THE APPLE SERIAL NB CARD PROVIDES ADDITIONAL COMMUNICATIONS processing capabilities to the Macintosh® II NuBus™ family of computers, which includes the Macintosh II, Macintosh IIx, and Macintosh IIfx computers. When appropriate communications software is downloaded into the memory of the card, it can be used to connect to various networking environments. Using the software and its own on-board processor, the card handles all communications tasks, leaving the main processor and memory in the Macintosh free for other tasks.

Overview

The Apple Serial NB card is an intelligent NuBus card that uses Apple's Macintosh Coprocessor Platform™ (MCP) architecture. The card has its own on-board Motorola® 68000 processor, 512 kilobytes (K) of memory (expandable to one megabyte), a multitasking operating system, and two Serial Communications Controller (SCC) chips that provide for a total of four serial ports.

When you first receive the card, two of the four ports are configured as higher-speed ports that can be used for V.35 or RS-422 types of connections. The other two ports are configured as RS-232-C ports. The RS-232-C ports are recommended for speeds of up to 19.2 kilobits per second (Kbps); the other two ports are DMA-backed and can operate at speeds of up to 64 Kbps. You can, however, configure all four ports to operate as RS-232-C ports.

Because the Apple Serial NB card has a multitasking operating system and multiple independent ports, it can support multiple networking protocols simultaneously.

If you are operating a Macintosh NuBus computer in a communications environment, installing the Apple Serial NB card in the computer will optimize your system, especially when it is running application programs. The improvement is a direct result of the card's on-board memory and processor. Communications software is stored in the card's memory, not in the Macintosh memory. Furthermore, the processor on the card does all communications tasks independent of the main Macintosh processor. Thus, the computer's memory and main processor can both be devoted to application programs and other noncommunications related tasks.

A typical use for the Apple Serial NB card is to install it in a Macintosh II serving as a gateway to other networks. These other networks may include, but are not limited to, Systems Network Architecture (SNA) networks that use Synchronous Data Link Control (SDLC) protocols, and international public data networks.

For example, you can install the Apple Serial NB card in a Macintosh II computer acting as a gateway between an AppleTalk® network and as many as four SNA networks simultaneously. Installing MacAPPC™ (version 1.1) in the card's memory provides the software necessary for connecting the AppleTalk network with the SNA network. MacAPPC 1.1 is Apple's implementation of LU 6.2 and PU 2.1 protocols. MacAPPC 1.1 is licensed software available as a separate purchase item from Apple Software Licensing. The Apple part number for MacAPPC 1.1 Developer's Kit is MO698/B. Use that number to order the MacAPPC 1.1 software.

You can also use MacAPPC 1.1 with the Apple Serial NB card to connect a stand-alone Macintosh II NuBus computer directly to an SNA network or other network.

Two cabling options are available for the Apple Serial NB card. One option is the Hydra cable, and it consists of four ports configured as RS-232-C ports. The other option is the V.35 cable, and it has one V.35 port and one RS-232-C port. These cables are available as a separate purchase item from your dealer.

Figure 1.1 shows how a Macintosh II computer, using the four-port Hydra cable, can be connected simultaneously to two SDLC networks and still have two ports for connecting to other networks.

- **Figure 1-1** A typical use of the Apple Serial NB card to connect to an SNA network

MSC L-2
DRAWING: 38 x 11 pi
12.5 pi caption to art b/b

What you need to get started

You need the following equipment to install the Apple Serial NB card:

- any computer in the Macintosh II NuBus family of computers
- System Software version 6.0 or higher
- either the Hydra cable or the V.35 cable
- appropriate software for the networking environment you wish to use, such as MacAPPC 1.1 for the SNA environment

Your Apple Serial NB card package

The Apple Serial NB card comes in a box that includes the following two items:

- The Apple Serial NB card
- This book, the *Apple Serial NB card Installation Guide*

Unpacking the box

Take all the materials out of the box and make sure you have the items shown in Figure 1-2.

▲ **Warning** Keep the card in its protective antistatic bag until you are ready to install it. ▲

- **Figure 1-2** Contents of the Apple Serial NB card box

MSC L-3
DRAWING: 21 x 12 pi
13.5 pi caption to art b/b

Installing the Apple Serial NB card

THIS CHAPTER OFFERS IMPORTANT SAFETY INSTRUCTIONS, DESCRIBES HOW TO open your Macintosh II, and gives instructions for installing the Apple Serial NB card in your computer. This chapter also describes the memory-expansion capabilities for the card and the options for configuring the ports as RS-232-C or as V.35/RS-422.

About installation

The Apple Serial NB card is designed to fit into any available slot in your Macintosh II computer. The installation process does not require special tools or technical knowledge. However, if you are at all hesitant about installing the Apple Serial NB card, ask an authorized Apple sales representative for assistance.

- △ **Important** If you plan to upgrade the card's memory or to change its port configuration, the card must be removed from your computer. See the sections in this chapter "Upgrading Memory" and "Configuring the Ports on the Card" for more information. △

Important safety instructions

Before you open the Macintosh II to install the card, observe the following warning:

- ▲ **Warning** If the power on your Macintosh II has been turned on, turn it off and wait at least five minutes before you attempt to install the Apple Serial NB card. You can turn off the computer in either of the following ways:
1. Choose Shut Down from the Special menu.
 2. Push once on the external power switch on the back of the main unit and wait for the unit to shut itself down. (If appropriate, make sure you save any data before shutting down by this method.) ▲

Electrostatic discharge precautions

Electrostatic discharge (ESD) can cause severe damage to sensitive microcircuits. You must take certain preventive measures to avoid ESD damage. When you handle the Apple Serial NB card, follow these precautions:

- **Observe proper grounding procedures.**

Be sure the computer is plugged in to provide grounding for the electrical components.

Ground yourself by touching the power supply case inside the computer. This discharges any static electricity that might be on your body or your clothing (see Figure 2-2).

- **Leave the card in the antistatic bag until you are ready to install it.**

- **Handle the Apple Serial NB card by the edges only.**

Do not touch the edge connectors, exposed circuitry, or printed circuits on either side of the card.

- **If possible, keep static-generating materials such as synthetic fabrics, plastic, vinyl, and foam cups and packing material out of the work environment.**

How to install the Apple Serial NB card

Before you begin, make sure that no disk is in the disk drive. Follow these steps to install the Apple Serial NB card.

1. Turn off the computer.

2. Do not unplug the computer.

For your safety, do not unplug the computer from its electrical outlet. This ensures proper grounding for electrical components.

3. Remove the lid from the computer's main unit.

Using a Phillips screwdriver, loosen and remove the security screw holding the lid to the main unit. (It's at the top center of the rear panel.)

Wrap your hands around the rear corners of the case as shown in Figure 2-1.

■ **Figure 2-1** Removing the lid

MSC L-4
ART: 32 x 11 pi
12.5 pi caption to art b/b

Press the latches as you lift up on the back of the lid.

When you feel the lid release, lift it all the way off the case and set it aside.

4. Touch the power supply case inside the computer to discharge any static electricity that might be on your clothes or body (Figure 2-2).

▲ Warning

It's OK to touch the power supply if the Macintosh II has not been turned on for some time. However, the power supply can get hot during normal use. If the computer has been on, shut it off and wait at least five minutes before you touch the power supply. ▲

- Figure 2-2 Touching the power supply case

MSC L-5

ART: 30 x 15 pi

16.5 pi caption to art b/b

5. Choose the expansion slot that you want to use. You can install the card in any vacant slot (Figure 2-3).

The expansion slots are the narrow plastic connectors running along the bottom of the main unit, near the back.

- **Figure 2-3** The expansion slots and expansion cover shield

MSC L-6
ART: 30 x 34.5 pi
36 pi caption to art b/b

6. Remove the expansion cover shield (Figure 2-3) that's behind the expansion slot you plan to use, by lifting up the shield until it is free of the guide and pin.

Save the shield. You will need it later if you take the card out of the slot. The card itself has a shield attached to it that will replace the shield you just removed.

7. Push out the plastic hole cover that lines up with the slot you plan to use (Figure 2-4).

Grasp the cover with your thumb inside the computer and your fingers outside. With your thumb, push the cover out and save it.

- ◆ *Tip:* If the hole cover is difficult to push out with your thumb, use the eraser end of a pencil or another blunt object.

■ **Figure 2-4** Removing the plastic hole cover

MSC L-7

ART: 15 x 13.5 pi

15 pi caption to art b/b

8. Insert the Apple Serial NB card into the expansion slot.

Pick up the card by the top of the metal bracket and the top of the card's other end.

The expansion cover shield on the card attaches to the inside of the back panel in the same way that the shield you removed in step 6 attaches.

Align the card so that the guide fits through the lower slot in the shield on the card, and the pin sticks up slightly through the hole at the top of the shield (Figure 2-5).

■ **Figure 2-5** Aligning the card

MSC L-8
ART: 18 x 16.5 pi
18 pi caption to art b/b

Align the connector on the bottom of the card directly over the slot.

Place one hand along the top edge of the card, directly over the connector area, and push down gently, but firmly, until the connector is fully seated.

- △ **Important** Don't force the card. If you meet a lot of resistance, pull the card out and try again. Don't wiggle the card from side to side when you insert it. Wiggling the card puts unnecessary stress on the card and slot, and may break important connections. △

You can test to see if the card is properly connected by lifting gently on the card. If you encounter resistance and the card stays in place, it is properly connected.

- △ **Important** The Apple Serial NB card requires 12.5 watts of power. If you plan to install several cards in the Macintosh II, you should consult the *Macintosh II Owner's Guide* for details on power consumption to be sure that overall power requirements do not exceed specifications. △

Power-on diagnostics

The Apple Serial NB card has two small light emitting diodes (LED) for power-on diagnostics. You can see these LEDs only if the cover is removed while the power is turned on. Therefore, checking the LEDs is primarily a task for trained technicians familiar with the potential for electrical shock hazards, and should not be attempted by untrained users.

If you will not be checking the LEDs, skip forward to the next section, "Replacing the Lid."

-
- ▲ **Warning** **Power-on diagnostics should be restricted to trained technicians.** Because power-on diagnostics require that the cover of the computer be off while the power is on, only trained technicians, who thoroughly understand the potential for electrical shock hazards, should do the procedure. Be careful *not* to touch the card or anything inside the casing of the Macintosh II when the power is on. ▲

The LEDs are only for power-on diagnostics. They tell you if the card is functioning properly when the power is first turned on. Figure 2-6 shows the locations of the two LEDs.

- **Figure 2-6** The two LEDs on the Apple Serial NB card

MSC L-10
ART: 25 x 13 pi
14.5 pi caption to art b/b

When the card is installed and the power is turned on, both LED lights should come on. This indicates that the card is testing itself. When the self-test is complete and the card is functioning correctly, the red light goes off. The green light stays on.

If the red light stays on or if the green light goes off, either the card is installed incorrectly or it is malfunctioning. Reinstall the card carefully following the procedures described in this chapter and then check the lights again. If the card still fails the power-on diagnostic test, see your Apple dealer for assistance.

- ♦ *Note:* These two LEDs are programmable. If the communications software that you are using with the Apple Serial NB card has reprogrammed the lights to serve a different function, they might be used to test other card features. Check the manual that you received with the communications software for a description of the lights' functions.

Replacing the lid

To replace the lid on your Macintosh II, follow these steps:

- 1. If the power to your Macintosh II is on, turn off the power.**
- 2. Replace the lid on the Macintosh II (Figure 2-7).**

Tip the front of the lid down so that it catches the three hooks under the lid in the front of the main unit's case. Lower the back of the lid onto the case until the rear latches snap into place. Replace and tighten the security screw with the Phillips screwdriver.

■ **Figure 2-7** Replacing the lid

MSC L-11
ART: 25 x 20 pi
21.5 pi caption to art b/b

△ **Important** When you reinstall the lid, ensure that it is properly seated before you install the security screw and turn on the power. △

Upgrading memory

You can upgrade the memory on your Apple Serial NB card by adding the Macintosh Coprocessor Platform (MCP) card memory expansion kit. The Apple Serial NB card is equipped with 512K of memory; using the MCP card memory expansion kit, you can increase the memory on the card to one megabyte (M). The kit is available through Apple authorized dealers who can install it on the card for you. Refer to Apple part number MO145LL/A to order the MCP card memory expansion kit.

Figure 2-8 shows the location for the memory expansion.

- **Figure 2-8** Location for the memory expansion

MSC L-12
ART: 25 x 10 pi
11.5 pi caption to text b/b

Configuring the ports on the card

The card's ports are named 1A, 1B, 2A, and 2B. Ports 1A and 1B can be configured as two high speed ports or two low speed ports. Ports 2A and 2B are configured as two low speed ports. When you first receive the Apple Serial NB card, ports 1A and 1B are configured as higher-speed V.35/RS-422 types of ports; ports 2A and 2B are configured as lower-speed RS-232-C ports.

If you need only one or two RS-232-C ports for your application, you do not have to reconfigure the card. For example, if you will use only one RS-232-C port for connecting to an SNA network, you do not have to reconfigure the card. Likewise, if you will use only one V.35 port to connect to an international data network, you do not have to reconfigure the card.

However, if you plan to connect to multiple networks that require RS-232-C ports, you can configure the card so that all four ports are RS-232-C. To do so, you must remove two small components, called R-paks, from the card. (R-pak is short for *resistor package*.) Figure 2-9 shows the location of the removable R-paks.

■ **Figure 2-9** Location of the removable R-paks

MSC L-13

ART: 25 x 30 pi

31.5 pi caption to art b/b

Being careful not to bend their pins, remove both R-paks to configure the card for four RS-232-C ports. Note the part numbers on the R-paks and identify the sockets for each one. Also note the location of the orientation mark on each R-pak. Store the R-paks in the card's antistatic bag.

If you want to reconfigure the card later so that ports 1A and 1B are again for a higher speed, plug the R-paks back into their previous locations. Each R-pak must be plugged into its original socket. As shown in Figure 2-9, the R-pak labeled RPA-15 should be plugged into the left hand socket; the R-pak labeled RPA-16 should be plugged into the right hand socket. Also make sure that the orientation marks are located to the left as shown in Figure 2-9.

△ **Important** *The two R-paks are not interchangeable.* If you inadvertently put the R-paks in the wrong sockets, or if the orientation marks are on the wrong side, the ports will not function correctly. △

❖ *Note:* Either both R-paks must be inserted or both must be removed. Removing a single R-pak *will not* configure the card to have one higher-speed port and three lower-speed ports. If only one of the two R-paks is inserted, the card will not function correctly.

If you are at all hesitant about removing the R-paks, contact your authorized Apple dealer for assistance.

Cabling for the Apple Serial NB card

THIS CHAPTER DESCRIBES THE DIFFERENT TYPES OF CABLES THAT YOU can use with the Apple Serial NB card. This chapter also identifies which ports to use for different networking environments and provides instructions for connecting the cable to the card that you have already installed in your Macintosh II computer.

Types of cables

You can connect either of the following cables to the Apple Serial NB card:

- **The Hydra cable, illustrated in Figure 3-1.** The Hydra cable has four ports, typically used for connecting to network devices such as cluster controllers, modems, and peripheral devices.

- **Figure 3-1** Hydra cable for the Apple Serial NB card

MSC L-14

DRAWING: 24 x 22.5 pi

24 pi caption to art b/b

- **The V.35 cable, illustrated in Figure 3-2.** The V.35 cable has a V.35 connector and an RS-232-C connector. The V.35 connector is typically used to connect to an international public data network.

- Figure 3-2 V.35 cable for the Apple Serial NB card

MSCL-15

DRAWING: pi

pi caption to art b/b

These cables are available as separately purchased items from your Apple dealer. Refer to the following part numbers to order the cables:

Hydra M0128LL/A

V.35 M0127LL/A

Determining which cable to use

To determine which cable to use with the Apple Serial NB card, you need to know

- the network environment in which you will use the Apple Serial NB card
- the kind of cabling your network requires

The Hydra cable has four RS-232-C ports. Two of the ports (labeled *1A* and *1B*) can support speeds of up to 64 Kbps, and the other two (labeled *2A* and *2B*) can support speeds of up to 19.2 Kbps. For the specific speed limitations of each port refer to the manual you received with the software that you plan to use with the card.

Table 3-1 lists the signal characteristics for each port connector on the Hydra cable. From this information, you can determine the appropriate port connector for the network that you plan to use.

You can connect to up to four networks at the same time, depending on the software available to support such connections. The four connectors on the Hydra cable are identified in Figure 3-3.

If you need to use all four of the ports for RS-232-C connections, be sure to remove the R-paks from the card when you install it. However, if you need to use only one or two of the ports for RS-232-C connections, use ports 2A or 2B, and you won't have to remove the R-paks from the card.

For example, if you have installed MacAPPC software (version 1.1) on the card and want to connect to an SNA network using an RS-232-C port, use port 2A or 2B.

The V.35 cable has the signal characteristics required for connecting to international public data networks. You can then use its RS-232-C port for connecting to another network. If you plan to use the V.35 cable, do not remove any of the R-paks from the card. The V.35 port on the V.35 cable corresponds to port 1A on the Hydra cable. The RS-232-C port on the V.35 cable corresponds to port 2B on the Hydra cable.

■ **Figure 3-3** Port connectors on the Hydra cable

■ **Table 3-1** Signal characteristics for the Hydra cable

MSC L-16
DRAWING: 10 x 10 pi
11.5 pi caption to art b/b

Cable Port	Recommended Speed	DMA Backed	RS-232-C*	RS-422	V.35
1A	up to 64 Kbps	Y	Y*	Y	Y
1B	up to 64 Kbps	Y	Y*	Y	Y
2A	up to 19.2 Kbps	N	Y	N	N
2B	up to 19.2 Kbps	N	Y	N	N

* Not recommended above 19.2 Kbps. Remove the R-paks from the card to use ports 1A and 1B as RS-232-C ports.

Connecting the cable to the card

To connect the cable to the Apple Serial NB card, perform the following steps:

△ **Important** Before you connect your Macintosh II computer to any network, be sure to contact your network administrator. △

1. Take the cable out of its container.
2. Holding the J-62 end of the cable in your hand, align the cable pins with the connector on the Apple Serial NB card at the back of your Macintosh II.

Figure 3-4 shows how to install the Hydra cable.

■ **Figure 3-4** Installing the Hydra cable

MSC L-17
DRAWING: 15 x 16 pi
17.5 pi caption to art b/b

3. Plug the cable end into the pin connector on the card.

Make sure all 62 pins are aligned correctly before you plug them into the connector. Do not force the pins into the connector. If they don't seem to plug in easily, unplug the connector and check for any bent or misaligned pins. Straighten any bent pins and gently plug the cable into the connector.

4. Tighten the connector screws with your fingers, as shown in Figure 3-5.

Contact your network administrator before you attempt to attach the cable to the network connector.

■ **Figure 3-5** Tightening the screws on the installed Hydra cable

MSC L-18

DRAWING: 17 x 14 pi

15.5 pi caption to art b/b